tissue containing the enzyme in a small amount of glycerin and placing this on a filter paper. From this mass the water circle spreads and the enzymes can be located at various radial distances from the center. In dealing with oxidases the whole process is performed in an atmosphere of hydrogen. It is not evident that this method is of any great value further than as a mere means of demonstrating the presence of certain enzymes. GRÜSS also claims by it to gain evidence that cytase is not distinct from diastase, and believes he has shown in a number of other cases that a single enzyme performs several catalytic functions. His arguments against the specificity of enzymes are to a degree plausible, but are far from conclusive.

GRÜSS also asserts,[8] on the basis of considerable experimental evidence, that the reducing power of fermenting yeast attributed to the action of reductase can be accounted for by the nascent hydrogen set free by the hydrogenase of the yeast. In the presence of fermenting yeast the reduction of sodium seleniate and sulfur occur as they do when treated with nascent hydrogen. He finds no evidence for postulating reductase in yeast. He believes that the fungi in general possess hydrogenase and not reductase. If this be true the reductions carried on by this group of plants are strikingly similar to the simplest reductions in the chemical laboratory. He agrees that yeast and other fungi show a very slight reducing power not due to hydrogenase, but the substance that produces this slight reduction shows none of the characteristics of an enzyme.—WM. CROCKER.

Germination in Rhinanthaceae.—SPERLICH[9] believes he has demonstrated that the germination of the seeds of the partially parasitic species, *Melampyrum silvaticum*, *M. arvense*, and *Alectorolophus hirsutus*, is greatly hastened by the presence of the host plant. These seeds show a considerable rest period and he concludes that the favorable action of the host is evident only up to the completion of the "after-ripening." A close examination of his data shows that his conclusions do not necessarily follow from them. He always gets a very low percentage of germination and great variations in results from similar cultures. This indicates the presence of some uncontrolled factor. On discussing "after-ripening" he makes no mention of the general connection of delayed and distributed germination with the seed coats, but attributes these phenomena to embryo characters. He apparently has no knowledge of the literature on the subject. One wonders if his results are not merely the measurement of seed-coat effects. He certainly has not demonstrated dormancy in the embryo itself, which is the first step in establishing his main position. The disposition of a number of German investigators to refer the phenomena of "after-ripening" to the mysteries of the protoplasm is to be deplored, especially when a thorough examination of the facts will often furnish a very simple explanation. It must not be forgotten, however,

[8] GRÜSS, J., Hydrogenase oder Reduktase? *Idem:* 627–630. 1908.

[9] SPERLICH, ADOLPH, Ist bei grünen Rhinanthaceen ein von einen pflanzlichen Organismus ausgehender äusserer Keimungsreiz nachweisbar? Ber. Deutsch. Bot. Gesells **26a**: 574–587. 1908.

that it has been clearly proved that the fungus of the host is necessary for the normal germination of the seeds of many orchids; but even here our knowledge is of little scientific significance until we know the exact method of the action of the fungus, whether its effect is due to the secretion of certain chemical compounds, which aid in water absorption, or to some other influence.—WM. CROCKER.

Chromogens.—TAMMES[10] reports a new chromogen, dipsacan, which is present in all the genera and species of Dipsaceae examined. Dipsacan has many points of resemblance to isatan and indican, yet it shows points of difference from both these, as well as from the pseudoindicans of the Acanthaceae. At temperatures above 35° C., in the presence of oxygen and water, dipsacan is transformed to a blue pigment, dipsacotin. The optimum temperature for this transformation is 100° C. At high temperatures, or at ordinary temperatures through the action of benzin, phenol, or dipsacase, an enzyme of this family of plants, dipsacan is transformed to a yellow-red pigment in the entire absence of oxygen. Upon admission of oxygen this pigment is transformed to dipsacotin.

PALLADIN[11] has already urged that chromogens are universally present in actively respiring portions of plants and that they are products of respiration. TAMMES'S results agree with this conception, for dipsacan is found to be most abundant in the most active portions of the plants and in those plants that are in the best condition for growth; otherwise only traces of dipsacan appear.

TAMMES suggests that dipsacan may be a glucoside, and that the yellow-red pigment, which originates independent of oxygen, is one the products of the hydrolysis; but it is not known that sugar is also a product. The formation of the dipsacotin from the yellow-red pigment is a matter of oxidation, as PALLADIN has shown is the case in the production of the pigments from numerous chromogens he has studied. It strikes one as possible that the formation of the chromatic materials in general requires both hydrolysis and oxidation. This would line up all these chromogens with indican.—WM. CROCKER.

Germination and light.—KINZEL[12] publishes another paper on the effect of light on germination of seeds, confirming the results of former papers and adding a number of species to those favored in germination by light.

In a discussion of "after-ripening" he states that the several years' delay in germination shown by the ripe seeds of *Thlaspi arvense* is due to the character of the embryo and not to the character of the coat, for the coat is very delicate. In an article published in 1906,[13] the reviewer has shown that the very marked delay

[10] TAMMES, TINE, Dipsacan and Dipsacotin, ein neues Chromogen und ein neuer Farbstoff der Dipsaceae. Recueil Trav. Bot. Neerland **5**:—. (pp. 48.) 1908.

[11] PALLADIN, W., Die Verbreitung der Atmungschromogens bei den Pflanzen. Ber. Deutsch. Bot. Gesells. **26a**: 378–389. 1908.

[12] KINZEL, WILHELM, Lichtkeimung. Einige bestätigende und erganzende Bemerkungen zu den vorläufigen Mitteilungen von 1907 und 1908. Ber. Deutsch. Bot. Gesells. **26a**:631–645. 1908.

[13] CROCKER, WM., Rôle of seed coats in delayed germination. BOT. GAZETTE **42**:282. 1906.